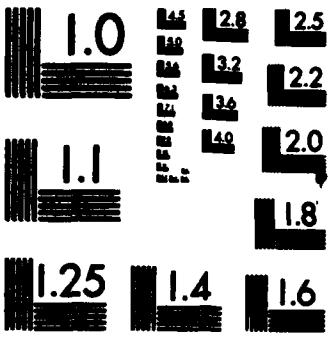
AD-A181 774 FIBER OPTIC ENGINEERING SENSOR SYSTEM DESIGN REVIEW REPORT(U) NKF ENGINEERING INC RESTON VA APR 87 NKF-7103-001/3 N00014-87-C-2032 1/1

UNCLASSIFIED F/G 20/6 NL



NKF Report No.
7101-001/3

[illegible] OPTIC
[illegible] SENSOR SYSTEM

DESIGN REVIEW REPORT

PREPARED IN RESPONSE TO:

CONTRACT NO. N00014-87-C-2032

PRESENTED TO:

FIBER OPTICS TECHNOLOGY PROGRAM OFFICE
NAVAL RESEARCH LABORATORY
WASHINGTON, DC 20375-5000

PRESENTED BY:

NKF ENGINEERING, INC.
12200 SUNRISE VALLEY DRIVE
RESTON, VIRGINIA 22091

APRIL 1987

DESIGN REVIEW REPORT

System Design Review Meeting
Naval Research Laboratory, Washington, DC
Tuesday 31 March 1987

A meeting was held, as required by CDRL A002 of Contract No. N00014-87-C-2032 and conducted per MIL-STD-1532, to orally present the findings and recommendations contained in the FOESS Phase I Preliminary Design Review Data Package, for formal review by NRL.

Attendees:

NRL

T. GIALLORENZI	Code 6500.	Superintendent Optical Services
M. MUSSELMAN	Code 6503.4.	Contract Monitor
C. VILLARUEL	Code 6571.	Technical Point of Contact

NAVSEA

F. LELAND	SEA 56Z34	Electrical Technician
J. ORSEGA	SEA 56Z14	Electrical Engineer
T. DAMERON	SEA 61Z141	Electrical Engineer
C. GABLER		Electrical Engineer

NKF

J. TURNER	Senior VP
J. JENKINS	Program Manager
R. BUTEUX	System Engineer
M. HOPKER	Program Office

ART

C. SLEMON	Design Engineer
D. NEUSCHULER	Test/Logistics Engineer

DSI

G. COGDELL	Program Manager Fiber Optic Support
J. MADARIS	Senior Engineer

1. Mr. Musselman opened the meeting by stating that the presentation should concentrate upon findings and recommendations with regard to sensors. Mr. Slemon began the presentation accordingly, drawing upon the booklet of hard-copy vugraphs ("System Design Review" dated 31 March 1987), which was distributed at the meeting. The following specific points were clarified in response to questions:

cont'd

a. Vugraph 12 - "Simple" Reflective Transducer Losses. The ray paths shown represent displacement effects only. Because the spherical mirror acts as a lens, capturing all of the propagating modes emanating from the fiber and imaging them onto the mirror, there is no modal dependence. Imaging however, increases alignment dependence requiring the use of misalignment insensitive designs, e.g. HAML.

b. Vugraph 17 - HAML Transducer. There is presently no specific data on the performance of the HAML since it is at present a concept design only.

c. Vugraph 18 - GACPV Transducer. The temperature dependence of the GACPV's force-to-displacement transfer function can be reduced or eliminated by selecting a sufficiently large force constant for the optical diaphram. Gases making the transducer suitable for operation over large temperature ranges would be identified during design and construction.

d. Vugraph 23 - Transducer Characteristic Summary. The key-term "Good" does not mean that a particular transducer will meet a MIL-SPEC. The terms used in the table are relative only to the four candidate transducers included and are derived from realistic assessments of their potential qualities. Construction and testing is necessary to verify the comparisons.

e. General.

(1) Of the sensors discussed, only the COIS (vugraph 24) has been manufactured.

(2) All of the transducers, including the GACVP (Vugraph 18), can be constructed by ART if required.

(3) The cost-competitiveness of fiberoptic sensors, relative to existing electrical types, is an important issue. However, it is premature to make conclusions at this point regarding their utility, because the fiberoptic sensor market is too immature. The aim of this project is to design and develop a complete system that has reduced weight, volume and cost, that is easy to maintain, functions reliably and is highly survivable.

2. Mr. Musselman then requested the NKF team's recommendations and plans for Phase II. Mr. Jenkins presented these as summarized in vugraphs 53-60.

3. The following points arose in discussion of the team's proposal for a modified technical approach (vugraph 60):

a. The HAML is the team's transducer of choice for immediate development.

b. The three proposed conversion modules will be designed to function equally well with any of the four candidate transducers, recommended for development.

c. Developing all four candidate transducers will reduce program risk and increase the probability that a system can be placed aboard a naval platform in the required time frame.

d. If schedule constraints dictate, the APEC FOS fiberoptic snapswitch can be immediately utilized in a shipboard demonstration system. However, only minor additions and/or modifications will be needed to make them compatible with FOESS and Optical Dichroic Ratiometry.

4. Mr. Musselman made it clear that the purpose of Phase II should be to validate the concepts formulated in Phase I. Rather than sophisticated finished products, the LDM should consist of a "Test Bed." It will be used to identify and illustrate the benefits and constraints of the concept designs and to formulate specifications for manufacture in subsequent phases.

6. In conclusion, Mr. Musselman stated that NRL will undertake an analysis to determine what specific tasks will be required in Phase II and that he will inform NKF of their decision in a timely manner.

7. Document Change. During conversations regarding optical power budgets, Messrs. Cogdell, Neuschuler and Slemon agreed that Section 7.4.2 of the "Preliminary Concept Design Review Data Package" should be altered to read "100um Loss Budget for Discrete Sensors."

14 April 1987

END

7-87

DTIC